('398) "RIE" system on the basis that

(A) "Szwejkowski states that using the gaseous component and flow rate of his invention will not result in the undesirable formation of particles on the wafer surface and will not condense at room temperature in the lines used to bring the etchant gases to the vacuum etch chamber."

In the "Response to Arguments" portion of the Final Office Action there is further indicated that the rejection is deemed proper despite the described differences in the type of RIE system used in each reference because:

B) it is well known in the art to employ inductively coupled plasma etching to RIE etch polysilicon and Szwejkowski discloses a process for RIE etching of tungsten/polysilicon on a Silicone wafer,

C) both Collins and Szwejkowski disclose plasma etching system[s] of low pressure and high density, and

D) both Collins (col. 9, lines 28-43) and Szwejkowski (col 3, lines 32-35) disclose the use of electrodes.

The above described prior art rejection of claims 1-6 and 11-14 is respectfully traversed as not representing a prima facie case of obviousness under 35 U.S.C. 103. In other words, the grounds presented in support of the rejection (summarized as "A" to "D" above) are respectfully submitted to fail to meet the requirements for a prima facie case of obviousness.

As to "A" above concerning the assertion that it would have been a motivating factor to use the secondary reference's flow rate in the base reference for the purpose of avoiding particles on the wafer and line condensation in the base reference's system, the Examiner's attention is drawn to the discussion in Applicants' last response. As noted in the last response, the referenced text relied upon as suggesting the use of the secondary reference's flow rate, when considered in its entirety, sets forth that

it is the use of high purity gaseous components in the etching process which avoids the undesirable formation of particles on the wafer surface and condensation at room temperature in the lines used to bring the etchant gases to the vacuum etch chamber. In other words, the stated avoidance of particle formation and condensation in the '398 reference is not the positive effects gained from a particular limitation of flow rate, but rather those gained from the use of high purity gas. This point is clearly apparent when compared with the section discussing the problems involving the BCl_3 gas used by the prior inventions (Column 1, lines 39-44). Accordingly, "A" above is respectfully submitted not to provide the indicated motivation set out in the Final Office Action.

As to the above noted grounds "B", "C" and "D", reference is first made to the appropriate legal standard required for establishing a prima facie case of obviousness. As set out in MPEP 2143.01 "[o]bviousness can only be established by combining or modifying the teaching of the prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art." As further set out in the MPEP 2143.01, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination."

As described in greater detail below, the presence of some common elements between the base reference and secondary reference does not establish the required suggestion or motivation to alter the flow rate of the base reference with that of the secondary reference, particularly when the recited structural elements are used differently in carrying of the respective etching methods.

The overview description paragraph bridging column 6 and 7 of Collins et al. ('501), describes a plasma reaction chamber which uses an inductive plasma source arrangement, a capacitively coupled bias arrangement and preferably a magnetically-plasma source confinement arrangement. The particular cathode arrangement is described in column 8, lines 15-42 of Collins et

al. ('501). The relationship between the means for inductively coupling RF electromagnetic energy into the processing chamber for generating a plasma within the chamber and the wafer support cathode arrangement is described in column 4, lines 27-32. This disclosure of Collins et al. ('501) describes the wafer cathode support arrangement being used for affecting control of the cathode sheath voltage and ion energy, independent of the plasma density control affected by the high-frequency power. Accordingly, Collins et al. ('501) is directed at a reactor which features an inductively coupled plasma generating system with an independent, additional capacitive control system.

In this regard reference is made to the enclosed article "Two Dimensional Modeling of High Plasma Density Inductively Coupled Sources For Materials Processing"[1] and the associated "Hybrid Plasma Equipment Model Inductively Coupled Plasma Reactive Ion Etching Reactors" which were located by the undersigned on February 23, 2000 in an effort to further appreciate the various nuances of the base and secondary references being relied upon in the present rejection. These two enclosed articles provide a consolidated description (particularly the section on page 468 "III Plasma Parameters" in the former article) of inductively coupled plasma sources including those with added magnetic field.

In the present Office Action the assertion of obviousness under "B" above is being based on the notion that the primary reference and secondary reference both involve reactive ion etching (RIE). It is respectfully submitted that a common categorization under RIE is insufficient to have the characteristics of one, quite different, system considered to carry over to the other system. In fact, Applicants respectfully submit that the flow rate of Szwejkowski et al. ('398) for a system that produces a plasma through ignition of the plasma between the support cathode and the grounded walls

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[1] P.L.G. Ventzek, R.J. Hoekstra, M.J. Kushner, "2-Dimensional Modeling of High Plasma Density Inductively Coupled Sources for Materials Processing", J. Vac. Sci. Tech. B. 12, 461 (1994).

of the chamber and grounded showerhead is never equally applicable to the method of Collins et al. ('501) having inductive coupling plasma generation with independent cathode control of the ICP produced plasma.

Accordingly, the mere fact that Szwejkowski is directed at an RIE etching technique ("B" above) does not provide a suggestion or motivation for using the claimed flow rate in Collins et al., particularly when one is using a completely different RIE etching technique compared to the other.

With reference to "C" above, the fact that the two references share some common features is not sufficient to satisfy the above noted requirements for establishing a prima facie case of obviousness, particularly when considering that the references, when considered as a whole, are directed at two quite diverse systems. In other words, a common categorization of a high density/low pressure etching system does not establish the suggestion or motivation required for altering the method of the base reference to use the flow rate of a second system using a different plasma generating technique.

Further as to "D", the mere presence of electrodes in each reference also does not provide the necessary disclosure or suggestion for altering the method of Collins et al's system. Moreover, electrode usage in the methods of the two systems is completely different in that in Szwejkowski ('398) one of the electrodes is used for plasma generation and in Collins, et al. ('501) the electrode is used as supplemental control to an inductive plasma generator.

In view of the above-described deficiencies in the '501 and '398 references, it is respectfully submitted that claim 1 (which includes reference to RF plasma generation in combination with the above noted flow rate range) is patentably distinct over the relied upon prior art. Claims 2-6 and 11-14 depend from claim 1 and thus are respectfully submitted to stand in condition for allowance without need for further discussion.

The remaining dependent claims (claims 7-10) were rejected as being unpatentable

under 35 U.S.C. § 103 based on the above combination of the '501 and '398 references, further in view of Tomita.

The Tomita reference is directed at a parallel plate electrode plasma generator system with various hole dimensions in its etching gas shower head and the downstream effect those hole dimensions have in the distribution of the gas flowing speed radially outward from the center. Tomita is thus directed at a different problem of trying to provide a high performance shower head hole pattern for achieving a desired gas flow downstream of the shower head. In addition to being directed at a different problem, the reference fails to remedy the above noted deficiencies in Collins ('501) and Szwejkowski ('398).

Based on the foregoing, it is respectfully submitted that the application stands in condition for allowance and confirmation of the same at the Examiner's earliest convenience is respectfully requested. If for any reason, however, the present case is not deemed to be in immediate condition for allowance (e.g., a remaining informality), the Examiner is invited to telephone the undersigned. Also, if there are any non-covered fees associated with this filing, authorization is provided to charge such fees to Deposit Account No. 02-4300.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP
BEVERIDGE, DEGRANDI, WEILACHER & YOUNG
INTELLECTUAL PROPERTY GROUP

By: _____

Dennis C. Rodgers, Reg. No. 32,936
1850 M Street, NW - Suite 800
Washington, DC 20036

TEL: (202) 659-2811
FAX: (202) 659-1462

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